

# Renewable Energy Services

All marine structures require information on the environment in which they will operate, as well as information specific to the particular energy source they seek to harness, whether it is winds, currents or tides. Fugro GEOS can provide this information throughout the life of a renewable energy installation.

Right from the feasibility stage of a project, Fugro GEOS can provide information on the region's climatology, while a review of the existing wind, wave, current and tide level data for the site can provide early screening for suitable areas and concepts.

As the project takes shape more detailed data will be required for designing the structure.

- What are the 100-year extreme values for wave heights or wind speeds?
- What is the best time of year for installation?
- What is the forecasted power output from the installation?

Fugro GEOS' expertise lies in providing cost-effective answers to these questions through statistical analyses using a combination of carefully-tailored measurement campaigns and modelled data.

During installation, we can provide real-time data on important parameters, such as wave conditions or tidal height that can be crucial to a successful installation, as well as weather forecasts to help with the planning of the installations.



**Site-specific measurements to ensure that wave criteria used for engineering purposes are fully validated**



**Meteorological mast, Morecambe Bay, UK: instrumented for wind measurements at five heights prior to design of the Shell Flats wind farm**

Then, once the installation is operational, our real-time systems, including CCTV and environmental parameters, can provide essential data on the performance of the site and its operation.

A few specific metocean concerns are outlined below for the marine renewable energy sector.

## Wind Energy

Of course, wind conditions at the site are critical to the turbine's performance as well as its structural integrity. However, current, tide and wave interactions around the prime locations for wind turbines (eg offshore sandbanks, reefs and mudflats) are known to be complex. In extreme situations, current and wave conditions at the site may result in scouring and erosion at the turbines' foundations.

Where existing data is sparse or non-existent Fugro GEOS can supply the sensors to measure these factors and monitor conditions after the installation.

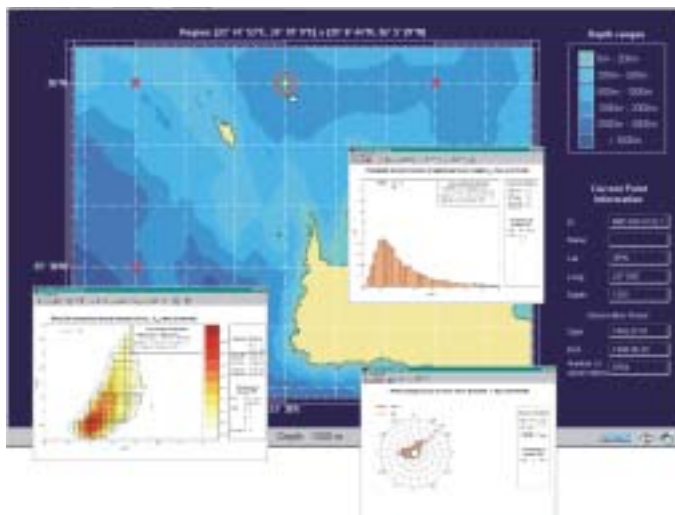
## Wave Energy

Fugro GEOS maintains an extensive global database of wave data from buoys, platforms, satellites and numerical models. These data have been integrated globally into our WorldWaves package. In conjunction with state-of-the-art models these data can be used to optimise the location of the wave energy generators within the local bathymetry.

While it is often sufficient to use existing data sources and models for feasibility studies, it is usually essential to make at least a few months of site-specific measurements to ensure that wave criteria used for engineering purposes are fully validated. In particular, measurements during the winter months are essential for validating statistics towards the extremes of likely conditions.

## Tidal Current Energy

A number of depth-averaged current velocity models are available in UK waters and it would be appropriate to access these data to provide an early indication of the feasibility of projects. These data would probably be sufficient to test whether the general location of a generator sites is viable.



**WorldWaves: data and toolbox for wave analyses at any location in the world**

Moving beyond the feasibility stage, it is recommended that site-specific measurements be made for energy output calculations, to determine the financial viability of the project, and for the engineering design. And, as with the installation of any structure offshore, Fugro GEOS can provide real-time information on the waves, tides and currents to help ensure a successful and safe outcome.

## Past Experience

Fugro GEOS has a long history working on renewable energy studies around the world. A selection is listed below.

*Wave Energy Resource Assessment for the South Pacific, 1987 to 1995 for the South Pacific Applied Geoscience Commission (SOPAC).*

*Pre-Feasibility Study for Wave Energy in the Philippines, 1996. For the Non-Conventional Energy Division of the Philippines Department of Energy (DoE – NCED).*

*Morecambe Bay Metocean Study, ongoing since 2000, for Shell UK Exploration and Productions.*

*Vessel-mounted ADCP Survey for renewable energy test centre off the Orkney Islands, 2001, for Highlands & Islands Enterprise.*

*Orkney Wave Assessments, 2004, for Ocean Power Delivery Ltd.*

Fugro GEOS is an international leader in providing meteorological and oceanographic services for engineering and operations in the marine environment. For more information on how we can help with the design, planning and installation of marine renewables, contact us at an address below.

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